NORTH HAMPTON STATE BEACH

Water Quality Report
Summer 2008

Seabrook Town Beach, Seabrook
Water Quality Report
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Table of Contents

List of Figures

List of Tables

Appendices

History of the Beach Program

The New Hampshire Department of Environmental Services (DES) recognizes a public health threat may exist within recreational waters and tests the water at the state's beaches to ensure swimmers are not exposed to disease-causing pathogens or cyanobacteria scums. The DES has operated a Public Beach Inspection Program, commonly called the Beach Program, for over 20 years.

The New Hampshire coastal beach monitoring program was initiated in 1989 with the DES inspecting five beaches. In October 2000, the United States Congress amended the Clean Water Act to include the BEACH Act. The Environmental Protection Agency (EPA) could now was now authorized to award grants to eligible states to develop and implement monitoring and notification programs. These programs protect the public from exposure to pathogenic microorganisms in coastal recreation waters.

The DES first received grant funds in 2002. Since then the New Hampshire Beach Program has successfully met all of EPA's performance criteria requirements (*National Beach Guidance and Required Performance Criteria for Grants*) and continues to expand the monitoring and notification program. Weekly summer monitoring throughout the state was conducted at nine beaches in 2002, and has since doubled to 16 by 2008. The Beach program strives to expand sampling to include all coastal New Hampshire beaches.

Coastal beaches are monitored for the presence of the fecal bacteria *Enterococci* which are present in the intestines of warm-blooded animals including humans. Fecal bacteria, when present in high concentrations and ingested, can commonly cause gastrointestinal illnesses such as nausea, vomiting and diarrhea. These indicator organisms signify the possible presence of other potentially disease-causing organisms in the waterbody.

Beach monitoring and bacteria source tracking have been implemented to protect public health. In a collaborative effort, the DES Beach program, towns, beach managers, recreational directors and health inspectors encourage public awareness of sources of pollution and environmental responsibilities. Thank you for your interest and concern in New Hampshire's water quality.

Beach Statistics

North Hampton State Beach is owned and maintained by the New Hampshire Division of Parks and Recreation, State Parks Bureau. It is located at on Route 1A in North Hampton. The beach season runs from mid-June to the beginning of September. During the season, beach use is allowed at all times.

State Beach is a 1,260-foot long sandy beach, with rocks exposed during low tide. The beach is used by the public for swimming and general relaxing, among other recreational activities. There are three access points to the beach area from the metered parking lot (Figure 1). There are lifeguards present throughout the bathing season between the hours of 10:00 A.M. and 4:45 P.M., and toilet facilities are available.

Waterfowl are frequently observed at the beach; the most commonly observed are gulls, especially at the northern end of the beach. There are restrictions for dogs on the beach, but dogs were noted during four routine inspections this summer. Dead fish were also observed in the beach area twice throughout the beach season.
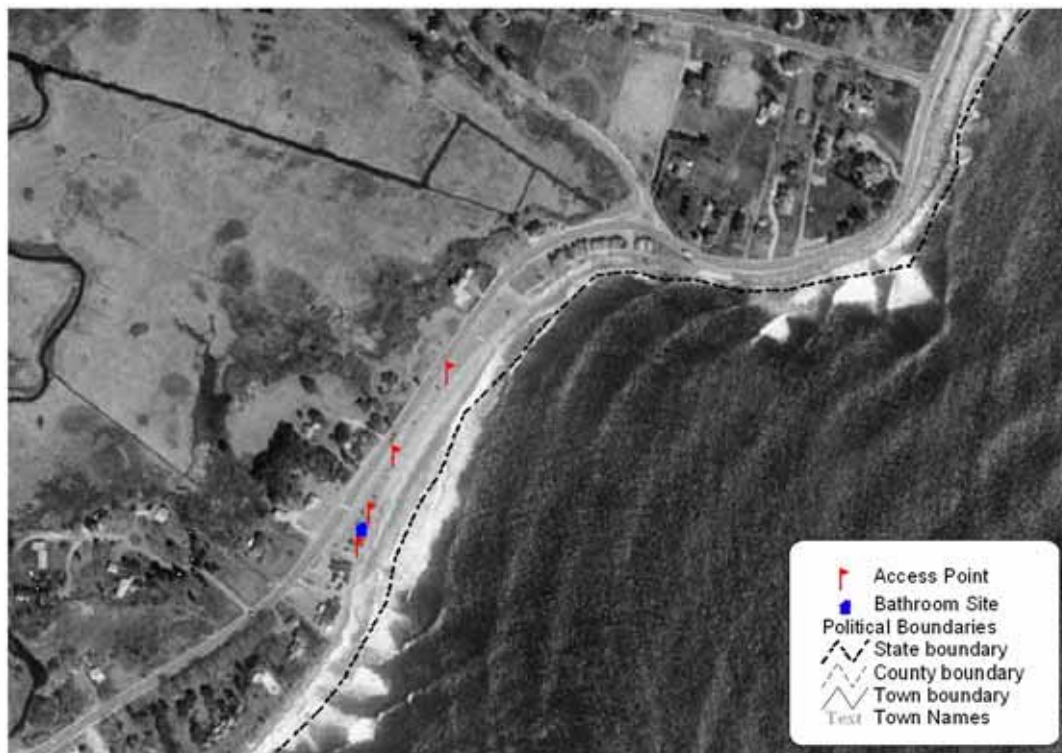

Figure 1. State Beach Access Points and Restroom Facilities.

Assessing Your Beach

Sampling Frequency and Location

The Beach Program developed a risk-based beach evaluation process and tiered monitoring approach during the 2003 beach season based on the EPA performance criteria. Beaches are evaluated annually to determine potential health threats to the public. Evaluations are based on several criteria within three main categories: beach history, microbial pathogen sources, and beach use. Beaches are now assessed as impaired for bacteria based on the most recent version of the Consolidated Assessment and Listing Methodology (CALM). The CALM assesses beach units as impaired based on historical exceedances of both the single sample and geometric mean bacteria standards. This report is submitted to EPA every two years.

Based on the evaluations, beaches are assigned a Tier I, Tier II, or Tier III status. Tier I beaches are considered "high priority" and have an increased potential to affect public health. Tier II beaches are "medium priority" and Tier III are "low priority" beaches that have less potential to affect public health. Beach sample frequency is based on Tier status; Tier I beaches are sampled twice per week, Tier II beaches are sampled once per week, and Tier III beaches are sampled every other week.

The number of samples collected at each beach is determined by the beach length. Beaches less than 100 feet in length are sampled at left and right locations one-third of the distance from either end of the beach. Beaches greater than 100 feet in length are bracketed into thirds and sampled at left, center and right locations. Routine sample collection may be enhanced by sampling known or suspected pollution sources to the beach area. Storm event sampling may be conducted at beaches where watershed runoff resulting from rainfall is expected to impact beach water quality.

State Beach is a Tier I beach indicating high priority, necessitating sampling twice each week. The frequency of sampling at State Beach has changed since the launch of the beach evaluation process implemented in the 2003 sampling season. The beach increased from being sampled every other week to being sampled once a week in 2004 due to increased use and high bacteria levels. In 2006, State Beach was again reclassified, this time as an impaired beach, thus requiring sampling twice each week. At State Beach samples are collected at the left, center, and right stations regularly (Table 1). All stations are evenly distributed along the shoreline (Figure 2) and can be accessed via the parking lot (Figure 1). Additional samples were also collected from Little River, which is north of State Beach and discharges at the northern end of the beach area (Table 1).

Table 1. State Beach Station Descriptions and Latitude/Longitude Points.

| Station Description	Latitude	Longitude
Left Sample Station: Located in front of the northern entrance to the beach (straight down from the concrete step).	42° 57' 21.6120"	-70° 46' 50.6255"
Center Sample Station: Located straight in front of the center entrance to the beach.	42° 57' 19.2096"	-70° 46' 52.7805"
Right Sample Station: Located straight in front of the southern entrance to the beach.	42° 57' 16.9279"	-70° 46' 52.3503"
Little River Sample: Located on the west side of Route 1A in the center of the river before it flows through the culvert.	42° 57' 27"	-70° 46' 45"
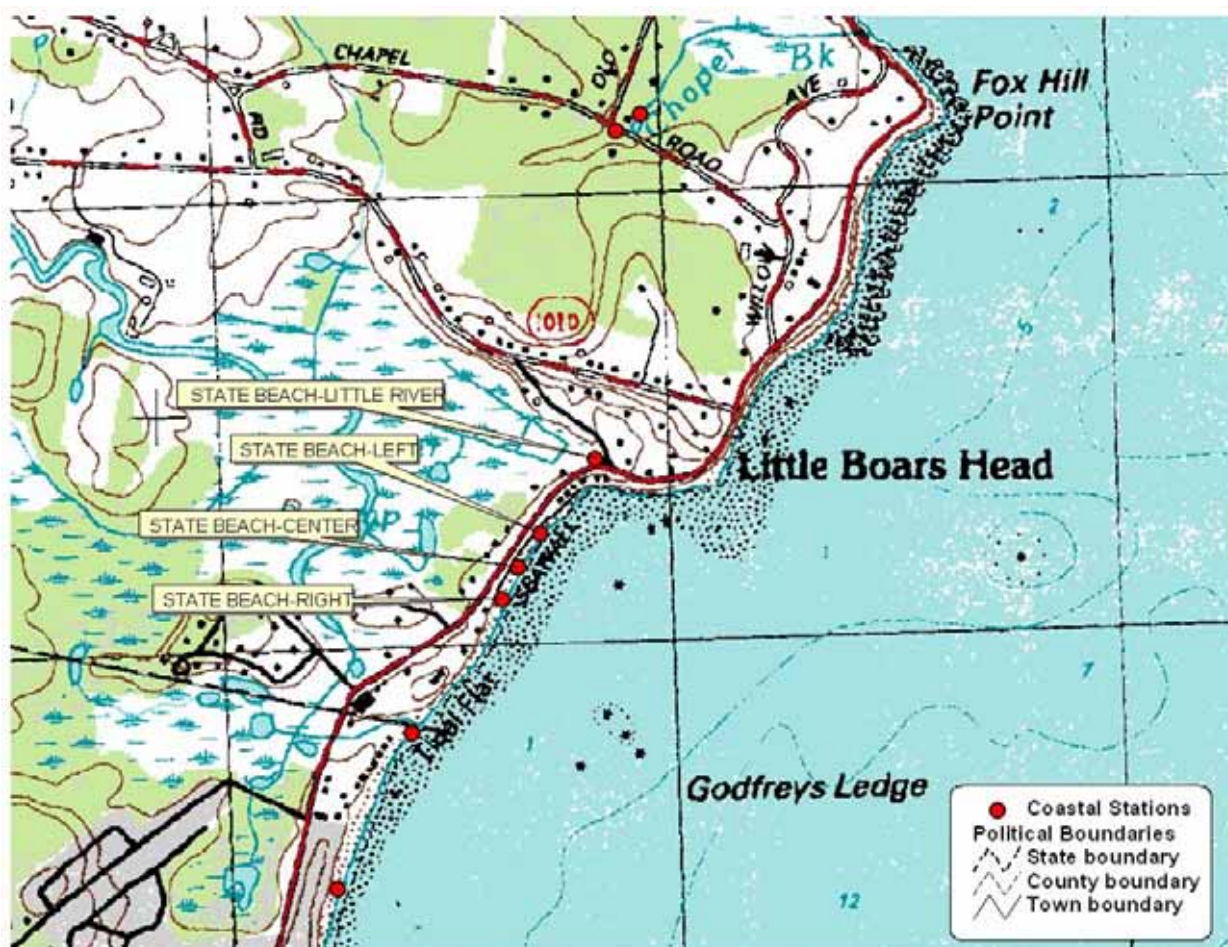
Figure 2. State Beach Monitoring Stations.

Coastal Water Quality Standards and 2008 Results

Beaches are monitored to ensure compliance with State water quality standards. Marine waters are analyzed for the presence of the fecal bacteria Enterococci. Enterococci are known as indicator organisms, meaning their presence may indicate the presence of other pathogenic organisms. The State standard for Enterococci at public beaches is 104 counts/100 mL in one sample, or a geometric mean of 35 counts/100 mL in at least three samples collected over sixty days. When samples exceed the standard, a beach advisory is issued, at which point the beach manager is notified and signs are placed at the entrances to the beach to warn the public of the potential health threat posed by water contact at the beach. Beach advisories remain in effect until subsequent beach sampling indicates safe water quality conditions.

The 2008 sampling season began May 27th. The sampling season encompassed 96 days. Precipitation was recorded on 32 days over the summer (based on Seabrook Power Station recorded precipitation). June wetfall totaled 1.85 inches while July and August yielded 4.48 and 3.26 inches of rain respectively.

At State Beach, 29 inspections were conducted during the 2008 beach season, with three additional inspections taking place in September. Ninety-six samples were collected and tested for Enterococci (Appendix B).   Overall, the 2008 summer Enterococci levels were moderate for State Beach (Figure 3), with one advisory issued, on July 25.

Samples collected at the left, center, and right stations at State Beach on July 24 had counts of 550, 520, and 490 Enterococci/100 mL, respectively. These counts significantly exceed the State standard of 104 counts/100 mL. The increased number of bacteria is likely a consequence of the severe weather conditions on July 24. Over two inches of rain had fallen in the 24 hours prior to sampling, and the weather continued to worsen as New Hampshire experienced its first significant tornado in several decades. It should also be noted that Little River, a point source to State Beach, had a count of 880 Enterococci/100 mL, which certainly contributed to the bacteria levels at the beach. During major storm events and large amounts of wetfall, stormwater run-off washes bacteria from the surrounding watershed into both the ocean and its tributaries. When bacteria-laden waters from a point source like Little River discharge to a beach area, they may drastically increase the amount of bacteria found in the water. As a result of the elevated Enterococci levels measured on the 24th, the Beach Program issued an advisory for State Beach on July 25. Samples collected on July 26 indicated that only trace amounts of bacteria were present, and the advisory was lifted the next day.
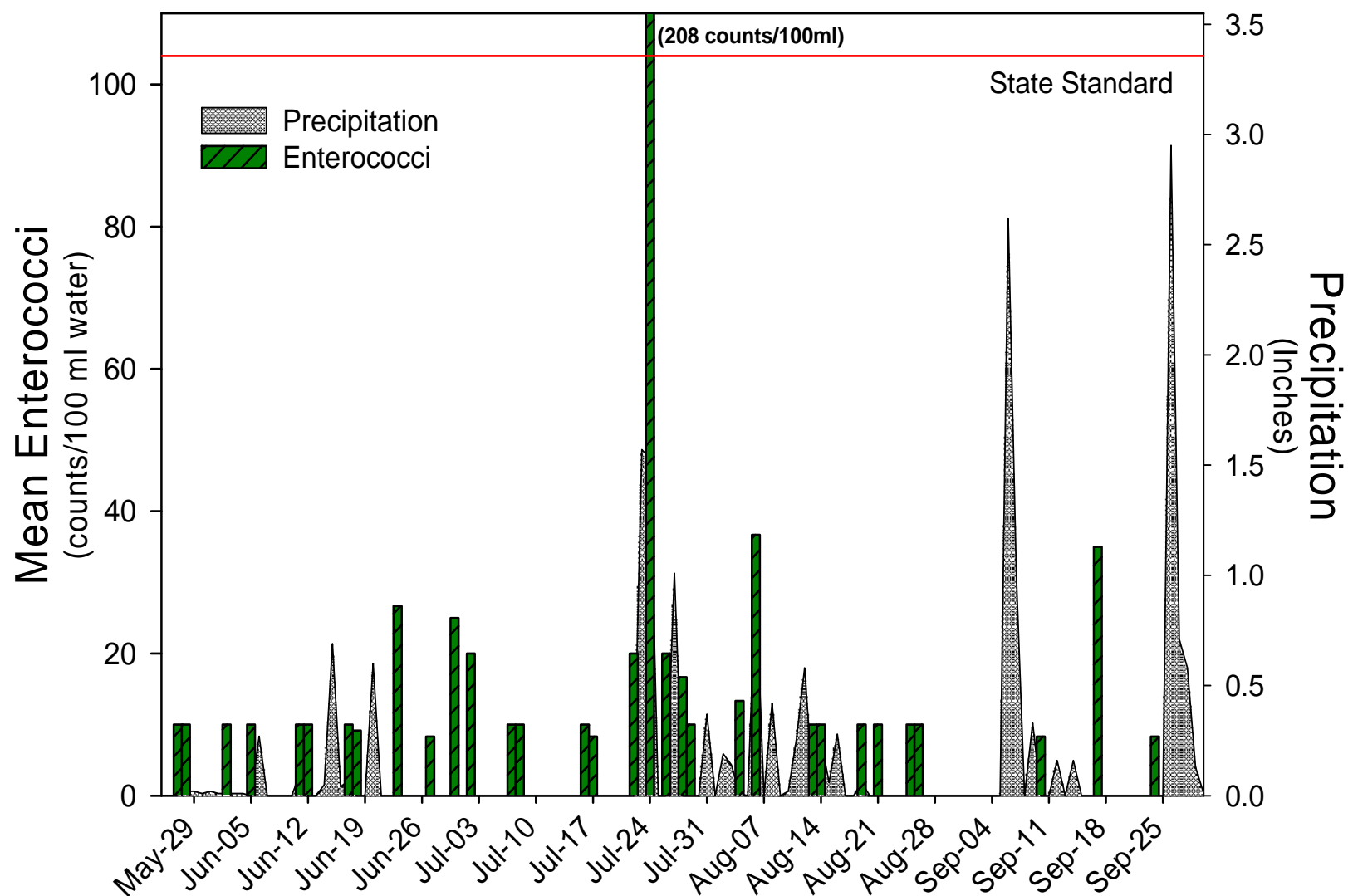
Figure 3. State Beach 2008 Enterococci Data. Enterococci values are the mean of the three collected beach samples. One advisory was posted at State Beach after the sampling on July 24, 2008, as indicated by the bacteria value exceeding the state standard. See Appendix B for all results from all stations for the 2008 sampling season.

Concerns

Little River continues to be a cause for concern at State Beach. The river has been identified as a pollution source to coastal waters, contributing to elevated bacteria levels. Precipitation and associated stormwater run-off to Little River and the subsequent discharge of this bacteria-laden water to the beach area continue to influence Enterococci levels at State Beach. The discharge from Little River especially impacts the left side of the bathing area, posing a potential health risk to the public.

Future Projects

- The DES Beach Program encourages participation between the State Parks Division, local businesses, or school groups and the Adopt-a-Beach Program. The program promotes beach clean-ups and water quality monitoring. The DES would conduct training sessions and participate in education and outreach activities for the community.

- Beach officials should consider erecting a sign to warn the public of associated health risks from high bacteria levels measured in Little River. The State Parks division may also consider posting signs warning the public not to feed waterfowl at the beach. The Beach Program is willing to collaborate on this effort by providing funds to purchase signs.

- A pre-emptive wetfall advisory may be necessary at State Beach. An analysis of historical bacteria data and wetfall may show a predictive relationship between a certain amount of wetfall and beach Enterococci levels that increase the potential of an advisory. Wetfall amounts exceeding this level would result in automatic beach advisories. A pre-emptive advisory plan will need to be devised and discussed by the beach manager and the Beach Coordinator.

If you are interested in any of these future projects, please contact Sonya Carlson at (603) 271-0698 or sonya.carlson@des.nh.gov.

Appendix A: 2008 Special Report – Stormwater Modeling

When rain falls over the land, it flushes bacteria and other contaminants that have accumulated on the landscape to our beaches. As impervious areas like pavement and buildings are constructed in a subwatershed, more runoff contaminants are carried to our beaches. In addition to increased impervious cover as a result of land use changes, New Hampshire has recently experienced substantial and prolonged wetfall events. With increased flushing of the landscape combined with expanded impervious cover, it is imperative for local and state governments to explore new management techniques to protect New Hampshire beaches from contaminant sources.

DES Beach Program monitors New Hampshire coastal waters for potentially pathogenic bacteria. The DES has been monitoring these beaches since 1989 and has amassed large amounts of bacterial information for most coastal beaches. This collected information over the past years can be used to predict bacteria counts that can be expected with present and future development.

The DES Beach Program is proactive and always researching new management practices that can improve beach quality and new techniques to accelerate the beach advisory notification process. Beach Program personnel sample coastal beaches 4 days a week. Advisories are issued once state bacteria standards are exceeded. Despite our protective efforts, at least 24 hours pass from sample collection to bacteria count determination. During this time DES and swimmers are unaware of bacteria levels. The period of time between monitoring and sample analyses certainly put swimmers at risk for potential illness.

Two important Beach Program goals are to determine watershed contribution of bacteria to coastal beaches and to predict bacterial concentrations during and after a rain event. Mathematical models can be used to ascertain categories of bacteria sources and to predict bacteria concentrations after a rain event. Such models are complex and require a great deal of expertise and technical skill. The DES has selected FB Environmental to utilize an appropriate model and to train Beach Program personnel how to apply the model. With detailed predictions of how wetfall will affect bacteria transport to coastal beaches, future buildout planning, mediation, and construction could be guided by a stormwater model. The DES hopes the model will provide a useful tool for town officials and law makers to improve public notification and protect public health.

With the ability to predict public beach bacterial concentrations DES could immediately post an advisory based on predicted values and conduct follow up sampling for verification. A predictive model would allow advisories to be posted as soon as a public health threat occurs. Collecting samples during times of predicted high bacteria levels will help DES verify the accuracy and precision of the model. A model can be an effective tool in helping us achieve our mission to protect the public from exposure to waterborne illness while enjoying New Hampshire waters.

In addition to coastal bacteria data, the model will incorporate land use categories, hydrology, topography, historical precipitation records, historical tide data, and waste management. The data collection effort for this project has been time consuming and required help from several sources outside the DES.   The DES would like to thank the National Oceanic and Atmospheric Association, the National Climatic Data Center, the Seabrook Nuclear Power Station and the Pease Air National Guard Base Weather Station for providing data. The model is only as good as the data we input, so we strive for the best quality controlled verified data available. The project is due for completion in early 2009.

Appendix B: State Beach 2008 Data by Date

Date	Enterococci (count/100 mL)				Tide Height (feet)	Rainfall in previous 24 hours (inches)	Number of bathers	Animal Presence
	Left	Center	Right	Little River				
5/27/08	< 10	< 10	< 10	10	0.94	0	0	2 dogs
5/28/08	< 10	< 10	< 10	< 10	1.71	0.09	0	0
6/2/08	< 10	< 10	< 10		9.23	0.01	0	0
6/5/08	10	10	10		7.14	0.01	0	0
6/11/08	< 10	< 10	< 10	260	1.75	0.1	6	0
6/12/08	< 10	< 10	< 10	10	5.07	0	2	0
6/17/08	< 10	< 10	< 10		8.22	0.11	30	0
6/18/08	< 10	< 10	< 10	< 10	6.75	0	7	3 birds, 1 dog
6/23/08	50	10	30	180	1.26	0	0	5 birds
6/27/08	< 10	5	< 10	40	3.17	0	5	10 gulls, fish skeleton
6/30/08	60	< 10	< 5		6.34	0	0	0
7/2/08	20	30	10		8.47	0	18	20 gulls
7/7/08	< 10	10	< 5	160	0.07	0	10	0
7/8/08	< 10	< 10	< 10	60	1.36	0	30	0
7/16/08	< 10	< 10	< 10		7.29	0	15	10 gulls
7/17/08	< 10	5	< 10		7.67	0	20	0
7/22/08	10	20	30	< 10	4.72	0	8	0
7/24/08	550	520	490	880	0.65	2.18	0	10 gulls
7/26/08	10	20	30		2.83	0	4	0
7/28/08	10	30	< 10		3.53	1.0	10	10 gulls
7/29/08	< 10	< 10	< 10		8.01	0	15	5 gulls
8/4/08	< 10	< 10	20	280	2.75	0.14	7	20 gulls
8/6/08	30	30	50	360	2.44	0.45	0	1 dog
8/13/08	< 10	< 10	< 10		7.74	0.17	10	0
8/14/08	< 10	< 10	< 10		8.11	0.03	5	15 gulls
8/19/08	< 10	< 10	< 10		7.02	0.06	3	20 gulls
8/21/08	< 10	10	< 10		1.77	0	25	13 gulls
8/25/08	< 10	10	10		1.64	0	4	15 gulls, dead fish
8/26/08	< 10	10	< 10		5.64	0	2	10 gulls
9/10/08	< 10	< 10	< 5		2.3	0.33	0	10 gulls
9/17/08	50	5	50		9.82	0	0	70 gulls, 1 dog
9/24/08	< 10	< 10	< 5		1.07	0	2	4 gulls, 2 dogs